DURING SIXTY YEARS.

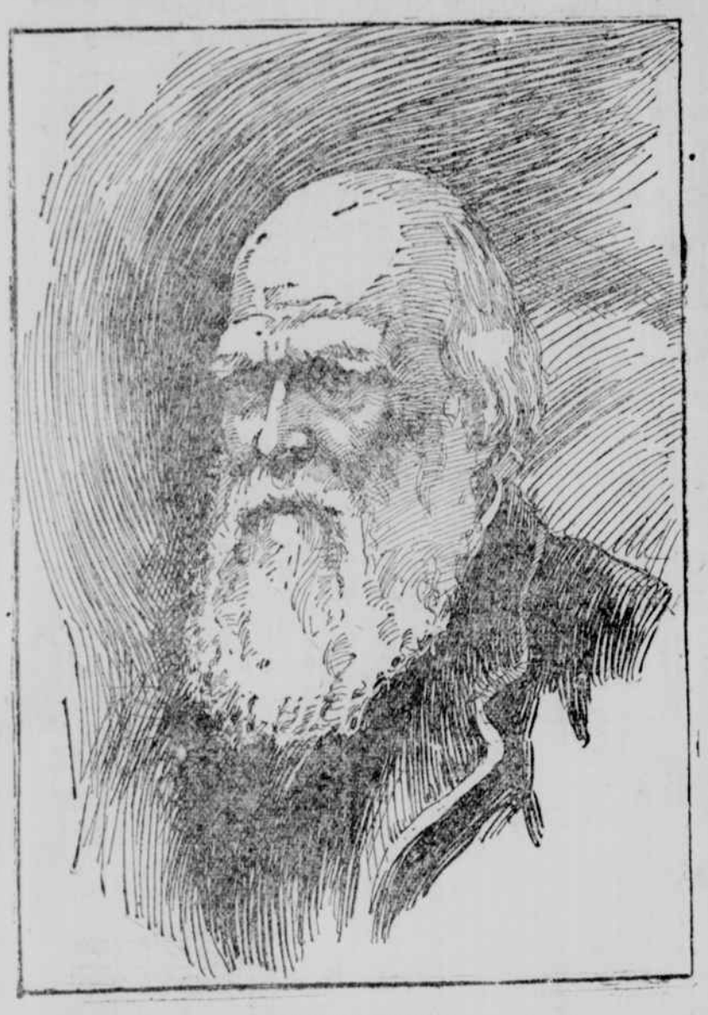
R. LYDEKER, F. R. S., WRITES OF THE MARVELS OF SCIENCE.

DARWIN'S DOCTRINE REVIEWED.

First Knowledge of the Giant Moa's Existence—Remarkable Animals Which Have Been Discovered During the Victorian Era.

(Correspondence of the Dispatch.)

LONDON, May 15.—Not the least remarkable among the events which have occurred during the reign of Queen Victoria are those which form mile-posts in the paths of biology. Within the sixty years referred to we have first learned of the gorilla, the potamogale, the water-chevrotain, the parti-colored bear, the Australian lungfish, and others. The dark corners of the earth have



CHARLES DARWIN.

been explored and opened up, and the fauna of Thibet and other parts of Central Asia, or a large portion of Africa, of New Guinea, of Central Australia, and of many Oceanic islands, as well as the interior of Borneo and Celebes, have been revealed and described.

The ornithology of South America has received an especial attention during the reign, while the magnificent expositions have made known the entire fauna and flora of the central districts of the New World. In the classification and morphology of fishes, as also in our knowledge of whales and other marine mammals, great advances have been made. In embryology and physiology the strides have been enormous.

New doctrines in connection with the evolution of animal life have also been propounded by Darwin within the period of which I write. Among these one of the most important, and one which has probably played a very considerable part in nature, is that of parallelism in development—that is to say, the independent development of similar structures in different groups of animals living under similar circumstances, or in course of adaptation to similar conditions of life. Mimicry, too, is another important factor in nature, the discovery and recognition of which has taken place during the Queen's reign.

The cutting of thin sections of animal and vegetable tissues and their examination under the microscope, and the wonderful results that have been obtained thereby, are also a development of the reign, as is likewise microscopy in general. Bacteria and microbes, again, are low types of life whose investigation forms one of the greatest achievements of the latter part of the era, and the incalculable benefits which have already been conferred upon suffering humanity by this line of study are well known.

The reign of Queen Victoria will be notable in future generations for scientific discovery and progress, and among the sciences that have advanced by leaps and bounds during this lengthened period, biology must surely occupy one of the most prominent positions. Indeed, it is almost impossible for workers at the present day to realize how imperfect was our knowledge, and how comparatively few were our books on biological subjects, in the year of grace 1837. To give any adequate idea of the amount of progress that has been made in even one branch of this science during the reign would be manifestly impossible in an article of the present length, and it is hence a matter of extreme difficulty to select points for special mention.

Of Owen's works the greater portion has appeared during the reign, although his memoir on the mammary glands of the duck-bill bears the date 1832. This serves to remind us that the history of the monotreme mammals has been practically worked out during the same period, the discovery that these animals lay eggs not having been announced till the year 1884. Although, owing to his persistent opposition to the doctrine of evolution, his theories of the relationships of animals have not met with acceptation, it is difficult to estimate the debt which zoology and paleontology owe to Owen for his work during the reign.

To him is due the honor of making known to the world the former existence of the gigantic extinct moas (Dinornithidae) of New Zealand, and also of the wonderful extinct marsupial fauna of Australia, while he was the pioneer in the elucidation of the equally marvellous fossil mammals in South America. Had these faunas not been discovered and worked out, we should never have gained our present ideas of the geographical distribution of animals. To the same master of anatomy is due the description of the long-tailed Jurassic bird (Archaeopteryx) in 1862, the fossil being one of the most remarkable "missing links" ever discovered—too late, unfortunately, for Darwin's "Origin of Species." Although many of his views are now proved to be erroneous, Owen also did much for the extinct Mesozoic reptiles, which he well christened Dinosaurs, and his labors laid the foundation for almost all subsequent work on fossil reptiles in general.

The mention of Dinosaurs naturally leads on to Huxley, who, although by no means essentially a paleontologist, was the first to point out the connection between that extraordinary group of reptiles and birds, a line of investigation in which he was ably seconded by J. W. Hulke. The life-work of Huxley was entirely produced during the reign, and how much it contributed to systematic and morphological zoology needs no mention here. One of his most famous memoirs—on the structure of the palate of birds—forms, to a great extent, the basis of the present classifications of the group.

HUXLEY'S CLAIM.

But in popular estimation Huxley's greatest claim is probably his brilliant advocacy of the evolution theory. That doctrine will ever remain the crowning

biological achievement of the record reign, and it is no disparagement to its illustrious expounders—Darwin and Wallace—to say that it was only through the unwearied labors of workers in other branches of biology, during and previous to the early part of the reign, that it was possible for them to have weaved the scattered facts and observations into one harmonious fabric.

Although Darwin's name is, in popular estimation, more intimately connected with the doctrine of evolution, that of Mr. Wallace (happily still among us) has obtained a well-deserved fame in connection with the geographical distribution of animals, a branch of biological science which may be said to be almost an exclusive product of the Victorian era. It was in 1835, two years only before the accession, that Swainson published his "Geography and Classification of Animals," and from that date till the appearance of Wallace's "Geographical Distribution of Animals," in 1876, this branch of science was being gradually evolved and perfected. Indeed, both on this and the other side of the Atlantic this interesting and important study is still employing the energies of several workers, although it would be obviously inappropriate to say much in this place regarding the labors of living writers. Evolution and geographical distribution may be regarded as sister branches of geology, as neither could exist without the other, and it is difficult to say which is most indebted to its fellow.

From the subject of the geographical distribution of animals and plants there is a gradual and imperceptible transition to the study of the changes in the relative distribution of land and water which have taken place on the surface of the globe during the later ages of its existence. And although this is in reality a geological rather than a biological problem, it is one intimately connected with the fauna of the ocean abysses. The interesting results obtained by the dredging cruises of H. M. ships Porcupine and Lightning, in the summer of 1868, 1869, and 1870, led to the dispatch on December 21, 1872, of H. M. S. Challenger, on a lengthened dredging and exploring voyage, which was brought to a successful termination on May 24, 1876, on the evening of which day the corvette anchored at Spithead. The results of this cruise revolutionized previous ideas as to the nature of the ocean-bed and the fauna of its abyssal depths, while a vast store of information was acquired with regard to pelagic creatures of all kinds. During the voyage the art of deep-sea dredging and sounding was brought nearly to its present perfection. This and other cruises made during the reign have brought to our knowledge the luminous fishes inhabiting the dark ocean abysses, and they have also revealed the fact that creatures, like the sea-lilies, long supposed to be practically extinct, are still abundant at suitable depths in the ocean. The publication of the scientific results of the Challenger's cruise commenced in 1880, and has only recently been completed.

Deep-sea dredging is closely connected with the establishment of marine biological stations, and the preservation and breeding of food-fishes and oyster-beds. These two are exclusively a product of the reign, and their importance from both a biological and an economical point of view can scarcely be overrated. Frank Buckland, in the first place, and Huxley, in the second, have in this department well shown how men of the highest scientific attainments can combine the pursuit of their own particular studies with others yielding untold advantage to our fisheries.

An equally close connection exists between deep-sea dredging and the study of the growth of coral islands and coral reefs, a subject entering upon the domain of both zoology and geology. This, too, is a subject whose development has taken place during the Victorian era, Darwin's well-known volume having appeared in 1851, while Dana's "Corals and Coral Islands" was published in 1875. That the last word has not been said in regard to the growth of coral islands is proved by the recent partially unsuccessful boring expedition to the Barrier Reef, of Australia, under the superintendence of Professor Sollas. To the older geologists it would, doubtless, come as a severe shock to learn that our massive Palaeozoic and Mesozoic limestones are, to a great extent, merely ancient coral-reefs, yet this is only one of the minor recent discoveries connected with the biology of the reign.

CUVIER'S DISCOVERIES.

Although Cuvier had long previously described the fossil mammals of the gypsum quarries of Montmartre, while a considerable amount of work had already been done on the remains of those from the French and German tertiaries, most other extinct tertiary land faunas have been made known since 1837. And what an important part the discovery and description of these faunas and floras have played in regard to our ideas of the evolution of human beings, and also in respect to geographical distribution, needs no telling here. Falconer and Cautley's Fauna Antiqua Sivalensis, in which are depicted the extinct mammalian remains from the Siwalik hills of Northern India, seems to most of us a work of very ancient time; nevertheless, the first part did not appear till 1845, while the last was published in 1849. Gaudry's description of the fossil animals of Attica only dates from 1862, while the discoveries of the extinct mammalian faunas of Hungary, Persia, China, and Samos are still more modern events. Within the last twenty years the working of the phosphorites of Central France for economical purposes has revealed the existence of a numerous Oligocene land fauna with which we were previously only very imperfectly acquainted. More important than all are the paleontological discoveries which have taken place late in the reign in the Mesozoic and Tertiary deposits of the United States. These have revolutionized many preconceived ideas, and have shown that for the future the most important advances in the structure and history of the higher vertebrates of past epochs must come from the other side of the Atlantic. Not only have entirely new groups of mammals, such as the horned Dinoceras and Titanotherium, been discovered there, but the remains of Dinosaurian reptiles are met within a state of perfection to which there is no comparison in other parts of the globe. These complete skeletons have not only fully borne out the speculations of Huxley and Hulke as to the close structural resemblance between these reptiles and birds, but have also shown how nearly the restorations attempted by the English anatomists approached the reality. Equally important have been the paleontological discoveries in South America—discoveries which indicate, without doubt, a former Tertiary land connection between that Continent and distant Australia. To even allude to some of the paleontological discoveries among the lower groups of animals is obviously impossible in the space at our disposal.

Systematic zoology and botany have passed through several stages during the period under review. As already said, at the commencement of the reign the former was laboring under the thrall of the circular hallucination, from which, however, it at length cast itself free. Since that time steady progress has, on the whole, been made in most branches, as any one may satisfy himself who contrasts the Linnean system (which was chiefly in vogue in 1836) with that to be found in any better class of modern text-books. And here it may be mentioned how vastly superior are these to their predecessors of half a century ago. Whether the progress has been equally satisfactory on the species question may well be doubted. Even early in the reign gibes and taunts were freely levelled at the "species monger," and it was thought by many that the publication of the "Origin of Species" would be the death-knell of abstraction, from which it took its name.

For a time, indeed, there was a lull, and naturalists seemed inclined to take a broader and more philosophic estimate of the amount of differences which ought to be regarded as of specific importance. But of late years, and especially in America, species-making has once more taken a new lease of life, and every little more or less constant difference is now regarded as of specific or "sub-specific" value. Indeed, we have even heard it whispered that a "species" of snail has been restricted to the individuals inhabiting a particular tree-trunk. As in stamps, refinement in making distinctions is almost an inseparable sequence of ardent collecting, but it is permissible to doubt whether the hair-splitting in this respect, characteristic of the present decade, will eventually be included in the biological progress of the Victorian era.

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Anglo-Saxon Music.

(Westminster Review.)

For the laity the crowth, harp, and pipe were favorite musical instruments. The tabor was used at Anglo-Saxon entertainments, but it was not so popular as these three. Drums were occasionally used to heighten the effect, but they, also, do not seem to have been in high favor. While the pipe was a favorite instrument among the lower classes, such as bear dancers and exhibitors of dancing dogs, the harp, on the other hand, was the instrument of the nobility; all noble children were taught to play on the harp. Thus the King of Westnesse commands the harp for the education of his son: "Teach him of the harp and of song; teach him to tug o' the harp with his nails sharp." Most famous knights of King Arthur were taught "harping." And we know that Alfred the Great put his knowledge of the harp to other than musical purposes. It is also worth noting that St. Aldehelm and St. Dunstan were renowned as harpers. In fact, a gentleman of Anglo-Saxon days was supposed to be able to play the harp as a matter of course, just as an American or English girl is supposed to play the piano.

A few specimens of very early Anglo-Saxon music remain, as, for example, the music to the "Praise of Virginity" and to other poems by St. Aldhelm; but we cannot interpret their peculiar notation—it is decidedly imperfect and misleading. F was represented by a red line and C by a yellow line, and singing marks or names were written between these lines, but the time is quite indefinite. As to harmony, considerable progress must have been made, since the nation used the harp and organ, and this implied some knowledge of concordant sounds.

It is claimed that Anglo-Saxon secular music was plaintive. Doubtless this was the case, for melancholy played a considerable part in their moods. The philosophy of Schopenhauer has a natural basis in the Teutonic nature; and among other rich deposits they possess a strong vein of pessimism. It must have found expression in Saxon music, as it assuredly found expression in Saxon poetry.

The Electrical Piano.

(Illustratedb American.)

A piano on an entirely new principle is announced from Germany. The strings are stretched across the sounding board as in the ordinary piano, but the entire hammer mechanism is absent. Instead, the depressing of the key puts in action a magnet, which automatically attracts and releases the wire, thus producing vibrations without the metallic stroke which accompanies the sound in the common type. The resulting effect upon the tones is said to be very remarkable. The high notes resemble those of an Aeolian harp. The middle and lower notes are like a 'cello or an organ. It responds readily to every variation in power and expression. A note can be sounded for several minutes without varying in quality. So radically different from an existing instruments are the effects that a new style of music is needed to bring out its capabilities.

Not in His Diocese.

(Time and the Hour.)

Happy was Bishop Potter's reply to a brother prelate whom he chanced to be visiting last summer at a popular seaside resort. As the bishops were walking home from the Sunday morning service they could not fail to notice the crowds of bathers in the surf, clad and unclad in all manner of costumes. The resident prelate turned to his visitor, saying with a sigh, "What should you do if you were confronted by a problem like that in your diocese?" Bishop Potter quietly replied, "Brother, this is not my see!"